

Stormwater Management Practices for Water Quality Improvement



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Town of Bluffton Municipal Complex
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Other Ideas for Stormwater Management??

- Rain gardens ✓
- Rain barrels ✓
- Buffers
- Pervious materials
- Backyard wetlands
- Maintenance!!!

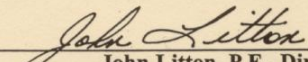


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**STATE OF SOUTH CAROLINA
NPDES GENERAL PERMIT
FOR
STORM WATER DISCHARGES
FROM
REGULATED SMALL MUNICIPAL
SEPARATE STORM SEWER SYSTEMS (MS4s)**

The Permit is issued in compliance with the provisions of the SC Pollution Control Act (S.C. Code Sections 48-1-10 *et seq.*, 1976) and with the provisions of the Clean Water Act, 33 U.S.C. §1251 *et. seq.*, (hereafter CWA or the Act), as amended by the Water Quality Act of 1987, P.L. 100-4. Upon being granted coverage under this general permit, operators of Regulated Small Municipal Separate Storm Sewer Systems that are described in Subpart 1.2 of this National Pollutant Discharge Elimination System (NPDES) general permit, except for those activities excluded from authorization of discharge in Subpart 1.3 of this permit, are authorized to discharge storm water to waters of the state of South Carolina in accordance with the conditions and requirements set forth herein.


John Litton, P.E., Director
Storm Water, Construction and Agricultural Permitting Division
Bureau of Water

Permit No.: SCS0000000

Issued: January 30, 2006

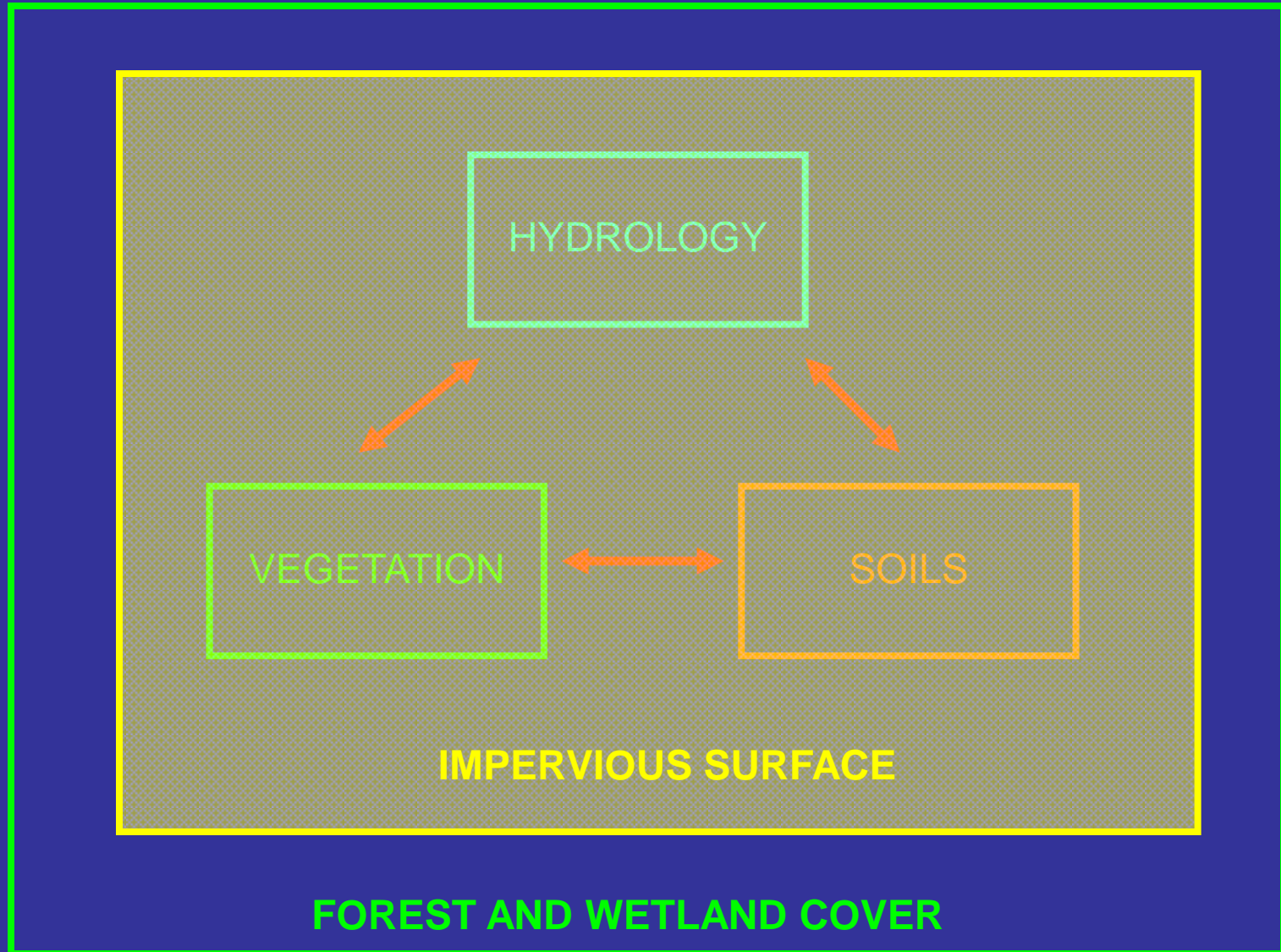
Effective: March 1, 2006

Expires: February 28, 2011

en (DO),
and



Stormwater Management Strategies: A Systems Approach



Types of Stormwater Management Practices

- **Conveyance:**
 - Open channel (swales and ditches)
- **Storage:**
 - Stormwater ponds / lakes
 - Stormwater wetlands
- **Infiltration**
 - Pervious surfaces
 - Rain gardens or Bioretention



Open Channel – Swales, Ditches, Canals

- Allows relatively rapid movement of stormwater
- Slows flow to allow sediment settling and some infiltration
- Can be attractor for wildlife and associated bacteria



Open Channel – Swales, Ditches, Canals



Stormwater Ponds / Lakes



Stormwater Ponds / Lakes

- **Advantages**

- manages stormwater *quantity*
- traditional...everybody's doing it
- aesthetically pleasing
- good at removing sediment and solids

- **Disadvantages**

- relatively land intensive
- safety issues
- poor removal of nutrients
- pathogen sink or source? TBD...

Pollutant Sources into Ponds

- Fertilizers (primarily nitrogen and phosphorus)
 - Nitrates – water soluble and moves with rain
 - Phosphorus – sediments
- Pesticides – runoff
- Bacteria (pets, humans, wildlife)
- Sediment (construction activities)
- Other pollutants





Considerations for Stormwater Ponds

- Homeowner activities
- In pond management strategies
- Buffers
- The “M” word = MAINTENANCE

Stormwater Management

Homeowner Activities

- Deliberate and conservative irrigation – stay off sidewalks!
- Fertilize only when needed – Clemson can help!
- Pesticide management
- Keep debris, yard waste, and leaves out of storm drains
- Collect and properly dispose of pet waste



Vegetated Buffers

- **Buffers**: corridors of native vegetation along rivers, streams, and tidal wetlands that protect waterways by providing a transition zone between upland development and adjoining surface waters (SC DHEC-OCRM, 2002).



Stormwater Ponds

Buffers

- Vegetated buffer strips
- Don't mow to the edge
- Plant native vegetation
- Slows stormwater flows and adds treatment
- Stabilizes banks and shorelines
- Littoral shelves or aquatic “benches”





This looks like a great place for
Ahhhh, much better!!!
a vegetated buffer strip...

Stormwater Ponds

Maintenance

- Developer to homeowner
- Who, what, when, how?
- HOA/POAs or homeowner?
- Ordinances or neighborhood covenants?
- Education and outreach programs available



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Homeowner Applications – Landscaping Ideas Using Pervious Surfaces

Gravel Paths, Vegetated Buffers, and Mulched Areas



Old Brick Pavers for Sidewalks



Block Pavers for Curved Sidewalks



Driveway Grass or Turf Strips



Infiltration - Pervious Pavers and Concrete



Alternatives to conventional surface materials

Increases chances for infiltration

Expensive

Maintenance

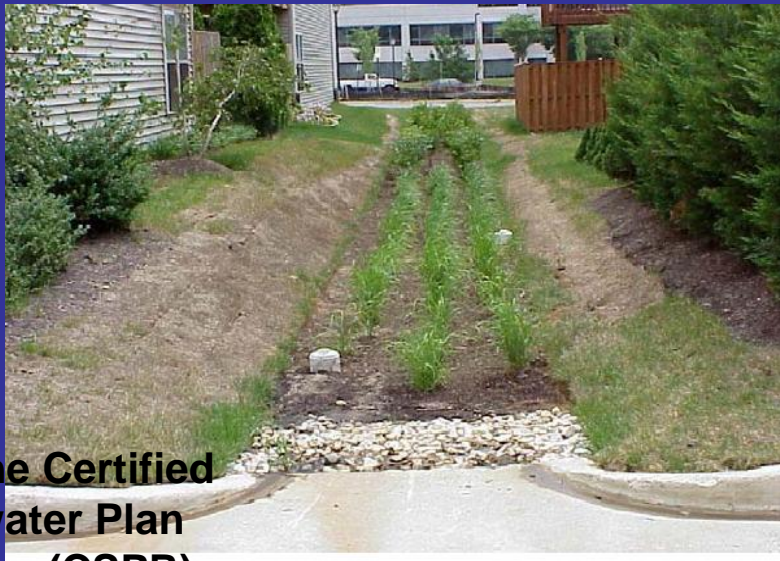
Weeds and clogging





Source: City of Portland, OR

Bioretention – a Variety of Designs



From the Certified
Stormwater Plan
Reviewer (CSPR) course

Stormwater Wetlands



Benefits from Using Stormwater Wetlands

- Good nutrient removal
- Aesthetically pleasing
- Provides natural wildlife habitat
- Relatively low maintenance costs
- Relatively low operations costs and energy use
- Great educational tools!



Limitations to Using Stormwater Wetlands

- Mosquito issues
- Invasive vegetation
- Nuisance “critters”
- Odor can be an issue
- Needs continuous baseflow for viable wetland
- Sediment regulation is critical to sustain wetlands



Factors Influencing Plant Selection

- Climate
 - ❖ Temperature
 - ❖ Latitude/solar radiation
 - ❖ Rainfall
- Nutrient loading
- Water depth
- Upland soil characteristics
 - ❖ Texture
 - ❖ Permeability
 - ❖ Organic content
- If possible, stick with native species!!



Stormwater Management Strategies

The “M” word = MAINTENANCE!

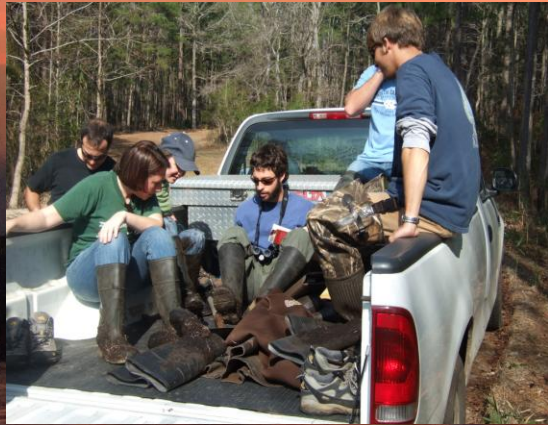
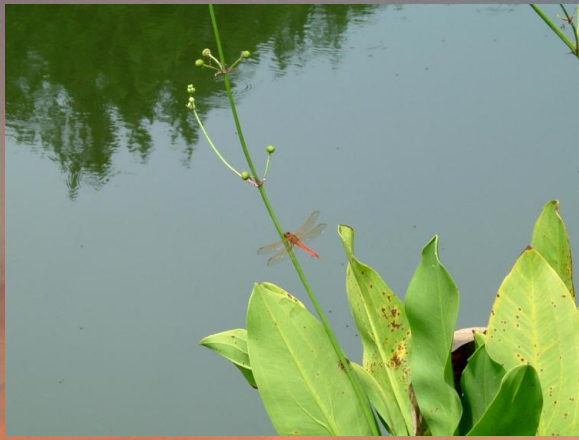
- The critical way to ensure stormwater mgmt success
- Must have a plan!! Who, what, when, where, how, how often?
- Many maintenances practices from which to choose
- Education and outreach programs available

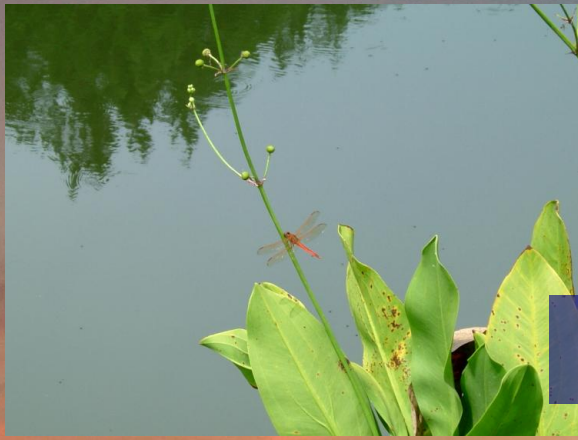


Education and Outreach!!









??? Questions ???



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